

SUBSTITUTE ABSTRACT OF THE DISCLOSURE

A Rn222 (radon) and Rn220 (thoron) radiation monitor that uses alpha-track detection film in multiple, separate chambers to detect radiation, wherein different diffusion barriers are used in each of the chambers to allow for signal differentiation between the chambers. The signal differentiation allows for differentiation between the levels of thoron and radon in the atmosphere tested. The radiation monitor may have three or four separate chambers, each with an electrically conductive housing and a cap with at least one opening to permit entry of ambient air. Inside each of the housings is an alpha-track detecting film, such as a solid-state nuclear track detector (SSNTD), with a thin electrically conducting cover. In one or more of the chambers is a diffusion barrier and seal placed within the housing to generally isolate the detecting film from thoron radiation in the housing.